Catalysis report

**Preparation of catalysts**

The catalysts used are a range of metals noted for catalytic activity in the reaction.

**Incipient wetness method**

The incipient wetness method is a type of catalyst deposition by way of impregnation[[1](#_ENREF_1)]. In this method, the material to be deposited is contained in a liquid. To impregnate, an amount of liquid corresponding to the pore volume of the particles is introduced to the solid particles. This amount of liquid allows for capillary action to draw the liquid into the particle, allowing a much faster and smoother deposition than pure diffusion, which would otherwise occur.

In standard dry (pore volume) impregnation, liquid is introduced until the catalyst starts to become wet, e.g. when the pores are filled. The incipient wetness method uses an empirical amount of liquid, found in advance.

**Characterization methods**

XRD

 X-ray-diffraction

**IR**

Infrared

Fourier Infra red

There are two different ways to perform IR analysis on a sample. The first is transmission spectroscopy, where light is shone through the sample, and diffuse reflection spectroscopy where the ir is reflected off a normally powdered sample[[2](#_ENREF_2)].

Light reflected off powder

Transmission cell

Physisorption (BET)

BET is a way of measuring the surface are of a sample using weak adsorption. The gas may physisorb on any part of the particle and the analysis may give total surface are and the pore size/pore volume

**Chemisorption**

Chemisorption relies on strong adsorption to the active sites, as opposed to physisorption, which may adsorb on the whole surface.

1. J. Haber, J.H.B., B. Delmon,, *Manual of methods and procedures for catalyst characterization (Technical Report).* Pure Appl. Chem.,, 1995. **67**(8-9): p. 1257-1306.

2. Weckhuysen, B.M., *In-situ spectroscopy of catalysts*. 2004, Stevenson Ranch, Calif.: American Scientific Publishers. xvi, 332 p.